3-21-84

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

IN THE MATTER OF

FISHER SCIENTIFIC

COMPANY

****
* ADMINISTRATIVE *
* CONSENT *
* ORDER *
****

The following FINDINGS are made and ORDER is issued pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection (NJDEP) by N.J.S.A. 13:1D-1 et seq. and the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and duly delegated to the Assistant Director of Enforcement of the Division of Water Resources pursuant to N.J.S.A. 13:1B-4.

FINDINGS

1. In 1978, the Borough of Fair Lawn discovered that two private non-potable wells located in the Fair Lawn Industrial Park contained volatile organic chemicals, including chloroform, 1,1,1-trichloroethane, carbon tetrachloride, and 16 other volatile organics. Subsequent sampling by the Borough of Fair Lawn revealed the presence of volatile organic chemicals in the Borough's Westmoreland potable wellfield at: Well No. 10, located at the southwest corner of 11th Street and Henderson Boulevard; Well No. 11 located at the northeast corner of Chester Street and Ontario Avenue; and Well No. 14, located at the southeast corner of Oak Street and Westmoreland Avenue. Two additional Borough potable wells near the Westmoreland wellfield were also found to contain volatile organic chemicals; Well Nos. 23 and 24 located off Pollitt Drive in the Fair Lawn Industrial Park. As a result of these findings these five wells were removed from service by the Borough.

2. NJDEP's Division of Water Resources (DWR) conducted an industrial survey in the Borough of Fair Lawn in an effort to identify industries using volatile organic chemicals, the handling, storage or disposal of which may have contributed to the presence of volatile organic chemicals in the wells identified in paragraph 1. As a result of this survey, Fisher Scientific Company (hereinafter Fisher), located at 1902 Nevins Road, Block 4902, Lot 1, in the Borough of Fair Lawn (hereinafter the site) was identified as one of these industries.

3. At the site, Fisher distills and repackages various laboratory reagents and clinical solutions, including solvents. The plant site contains a tank farm, warehouse facilities with loading and unloading areas, a storm water neutralization dry well and an area previously used for the storage of drums.

4. DWR conducted a comprehensive investigation of the site in conjunction with Fisher. This investigation included the installation and sampling of ground water monitor wells, analysis of ground water from the wells, collection and analysis of soil samples from borings and collection and analysis of samples from adjacent off-site wells. Based upon the findings of said investigation and other factors DWR concluded that the site is one of the sources of the volatile organic chemicals in the Borough's wells identified in paragraph 1.

5. Fisher expressed a desire to cooperate with the NJDEP to settle this matter. Therefore, based on the information available to the parties on the effective date of this ADMINISTRATIVE CONSENT ORDER and without trial or adjudication of any issues of fact or law and without Fisher's admission of liability or responsibility, NJDEP and Fisher have agreed to execute this ADMINISTRATIVE CONSENT ORDER.

ORDER

NOW THEREFORE IT IS HEREBY ORDERED AND AGREED THAT:

6. Fisher shall submit, within fifteen (15) days of the effective date of this ADMINISTRATIVE CONSENT ORDER, for approval by NJDEP, a soil boring and sampling plan designed to delineate all on-site sources of contamination. The plan shall contain, at a minimum:

a. the number, location and projected depth of each soil boring;

b. the sampling procedures to be implemented;

c. the field instrumentation and analytical sampling protocol; and

d. the quality assurance/quality control plan.

7. After Fisher submits the soil boring and sampling plan required by paragraph 6 of this ADMINISTRATIVE CONSENT ORDER, NJDEP shall review the plan. As part of the review process, NJDEP shall consider, at a minimum, the following factors:

a. size of the site;

b. known areas of on-site contamination;

c. site and regional hydrogeology;

d. acceptable professional practices;

e. established technology;

f. reliability of program;

g. implementability of program.

In the event that NJDEP determines that the plan is in need of modification, NJDEP shall submit its comments to Fisher. Within fifteen (15) days of its receipt of NJDEP's comments, Fisher shall modify the plan as necessary to conform with said comments and shall submit the modified plan to NJDEP for its approval. Within sixty (60) days of NJDEP's approval of the plan, Fisher shall have completely fulfilled all requirements of the approved plan.

8. Fisher shall install additional monitor wells on-site within ninety (90) days of the effective date of this ADMINISTRATIVE CONSENT ORDER as follows:

a. One (1) shallow well drilled to a depth of 40 feet shall be installed according to the Monitor Well Specifications on Attachment A. This shallow well shall be cased and sealed into competent bedrock with the open bedrock borehole extending to 40 feet below the ground surface.

b. Four (4) deep wells drilled to a depth of 100 feet shall be installed according to the Monitor Well Specifications on Attachment B. These deep wells shall be cased and sealed to a depth of 70 feet with the open bedrock boreholes extending to 100 feet below the ground surface.

c. The above described wells shall be installed at the general locations as indicated on Attachement C. The exact locations shall be mutually determined in the field by DWR and Fisher's consultant.

d. During drilling operations through the overburden, at wells which are located ten (10) feet or more beyond existing monitor wells, split spoon soil samples shall be obtained at five (5) foot intervals, at changes in soil strata, and at any zones that show obvious signs of contamination. At drilling locations within ten (10) feet of existing monitor wells, soil samples shall be obtained in the manner specified above but only at those depths beyond the depth of the adjacent well. The soil samples shall be saved for possible future reference and/or analysis.

e. Fisher shall notify Mr. Steven Spayd of the New Jersey Geological Survey at (609) 292-0668 or an appropriate representative of the New Jersey Geological Survey if Mr. Spayd is unavailable, at least ten (10) days in advance of the date of installation. The above wells shall be installed by a New Jersey licensed well driller with the appropriate permits obtained from the DWR's Water Allocation Unit at (609) 984-6831. All well casing elevations shall be surveyed to the nearest hundredth (0.01) foot above mean sea level.

9. Fisher shall collect water samples from all of the new and existing on-site monitor and production wells within thirty (30) days after installation of the new wells. Sampling shall be conducted as described in the Ground Water Sampling section of DWR's Field Procedure Manual for Water Data Acquisition (see Attachment D). These water samples shall be analyzed at a laboratory certified by NJDEP for the following parameters:

Total Dissolved Solids

Total Organic Carbon

Volatile Organic Scan

The volatile organic scan shall be performed as defined by USEPA Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater EPA - 600/4-82-057, July 1982, method 624. If NJDEP determines that the concentration of Total Organic Carbon (TOC) is excessive in relation to the volatile organic chemical concentration, Fisher shall conduct additional analytical work to determine the nature of the contaminants.

10. The above described sampling program shall be performed by Fisher on a quarterly basis. After one (1) year NJDEP shall evaluate the existing sampling program and shall determine if the program requires modification. If NJDEP determines that such modification is required, Fisher shall implement all measures included in the modified program. All analytical results generated by the existing program or any modified program shall be submitted to DWR within forty-five (45) days of sample collection. DWR shall be advised of proposed sampling dates at least ten (10) days in advance and may elect to split samples with Fisher.

11. Fisher shall submit a hydrogeologic report to NJDEP for its approval within one hundred and ninety-five (195) days of the effective date of this ADMINISTRATIVE CONSENT ORDER. The report shall be prepared by a qualified hydrogeologic consultant and contain the following information:

a. The analytical results of all samples required in this ADMINISTRATIVE CONSENT ORDER;

b. Details of the completed soil boring plan;

c. Drilling logs and as-built construction diagrams for each soil boring and monitor well;

d. Well casing elevations;

e. Monthly static water level elevation measured to the nearest hundredth (0.01) foot in each monitor well;

f. Ground water contour map(s).

g. Conclusions concerning the type(s) and location(s) of on-site sources of contamination and ground water flow mechanisms, rate(s) and direction(s) (both horizontal and vertical).

12. After Fisher submits the hydrogeologic report required by paragraph 11 of this ADMINISTRATIVE CONSENT ORDER, NJDEP shall review the report. In the event that NJDEP determines that the report is in need of modification, NJDEP shall submit its comments to Fisher. Within twenty-one (21) days of its receipt of NJDEP's comments, Fisher shall modify the report to conform with said comments and shall submit the modified report to NJDEP for its approval.

13. Fisher shall within one hundred twenty (120) days after receiving NJDEP's approval of the hydrogeologic report, conduct and submit to NJDEP, for its review and approval: (1) a feasibility study of remedial action alternatives for the site, and; (2) a detailed remedial action plan, including a time schedule, to implement the selected alternative. The time schedule shall include beginning and end dates for each major component of the remedial action plan. The feasibility study shall identify and evaluate all remedial action alternatives for the site. The feasibility study shall recommend the cost effective remedial action alternative which is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of the public health, welfare, and the environment. For the purposes of evaluating the alternatives, it shall be assumed that the air stripping unit and related appurtenances to be utilized by the Borough of Fair Lawn for the treatment of the five potable water wells identified in paragraph 1 shall be in operation for a period no longer than ten (10) years beginning on July 1, 1984.

All remedial action alternatives shall be subjected to an initial screening to narrow the list of potential remedial action alternatives for further detailed analysis. The following criteria shall be used in the initial screening of alternatives: (1) environmental and public health impacts, (2) engineering feasibility and reliability and (3) cost including operation and maintenance costs.

Subsequently, a more detailed evaluation shall be conducted of the alternatives that remain after the initial screening. The detailed analysis shall include:

a. A refinement and specification of each alternative in detail, with emphasis on use of established technology;

b. An evaluation of each alternative in terms of engineering implementation including feasibility, reliability, and constructability;

c. An assessment of each alternative in terms of the extent to which it is expected to effectively mitigate and minimize damage to, and provide adequate protection of public health and welfare and the environment, relative to the other alternatives analyzed;

d. An analysis of any adverse environmental impacts, methods for mitigating these impacts and costs of mitigation;

e. A cost estimation (±25 - 30%) of each alternative including engineering costs, construction costs, operation and maintenance costs and distribution of costs over time; and

f. A time schedule for implementation of each alternative. The time schedule shall include estimated beginning and end dates for the major components of each alternative.

14. In the event that NJDEP determines that the feasibility study or the remedial action plan is in need of modification, NJDEP shall submit its comments to Fisher. Within forty-five (45) days of its receipt of NJDEP's comments, Fisher shall modify the study and/or plan as necessary to conform with said comments and shall submit the modified study and/or plan to NJDEP for its approval. After receiving NJDEP's approval of the remedial action alternative and the remedial action plan, Fisher shall initiate and complete the plan in accordance with the approved time schedule. Delays not caused by Fisher in obtaining permits for the implementation of said plan shall be considered a Force Majeure event.

15. Fisher shall within thirty (30) days of the effective date of this ADMINISTRATIVE CONSENT ORDER issue a certified check to the NJDEP payable to the Borough of Fair Lawn in the amount of $247,000. Said payment shall represent Fisher's share of restitution to the Borough for additional expenses incurred or to be incurred by the Borough during the time period from January 1, 1979 to July 1, 1984 as a result of the contamination of the five potable water wells identified in paragraph 1. Said payment shall not be construed as a penalty.

16. Fisher shall within one hundred and twenty (120) days of the effective date of this ADMINISTRATIVE CONSENT ORDER issue a certified check to the NJDEP payable to the Borough of Fair Lawn in the amount of $253,000. Said payment shall represent Fisher's share of the cost of the design and construction of an air stripping unit and related appurtenances to be utilized by the Borough for treatment of the five contaminated potable water wells identified in paragraph 1. Said payment shall not be construed as a penalty.

17. Fisher shall within one hundred and eighty (180) days of the effective date of this ADMINISTRATIVE CONSENT ORDER issue a certified check to the NJDEP payable to the Borough of Fair Lawn in the amount of $110,000. Said payment shall represent Fisher's share of the cost estimated to be incurred by the Borough for the operation and maintenance of the air stripping unit and related appurtenances over a ten (10) year period. Said payment shall not be construed as a penalty.

18. a. Fisher shall within thirty (30) days after the effective date of this ADMINISTRATIVE CONSENT ORDER, obtain and provide to NJDEP an irrevocable letter of credit in the amount of $2 million to secure performance of all obligations under this ADMINISTRATIVE CONSENT ORDER. Said letter of credit shall be issued pursuant to the provisions of N.J.S.A. 17:9A-25(3) and shall not be automatically renewable but shall be renewable upon reapplication and review only. Fisher shall maintain said letter of credit continually during the term of this ADMINISTRATIVE CONSENT ORDER.

Fisher shall within thirty (30) days after approval of a remedial action alternative by NJDEP pursuant to paragraph 14 of this ADMINISTRATIVE CONSENT ORDER amend the letter of credit to an amount equal to the estimated cost of fully implementing the approved alternative, including any operation and maintenance costs if applicable.

b. Fisher shall within thirty (30) days after the effective date of this ADMINISTRATIVE CONSENT ORDER, establish a standby trust fund. All amounts paid pursuant to a draft by NJDEP shall be deposited promptly and directly by the issuing institution into said standby trust fund. In the event that NJDEP determines that Fisher has failed to perform any of its obligations under this ADMINISTRATIVE CONSENT ORDER, NJDEP may draw on the letter of credit; provided however that before any draw can be made, NJDEP shall notify Fisher in writing of the obligation(s) which it has not performed, and Fisher shall have a reasonable time, not to exceed fifteen (15) days to perform such obligation(s).

c. At any time, Fisher may apply to NJDEP for approval to reduce the amount of the letter of credit to reflect the remaining costs of performing its obligations under this ADMINISTRATIVE CONSENT ORDER, or to substitute other financial assurances in a form and manner acceptable to NJDEP.

19. Any submission of information required by this ADMINISTRATIVE CONSENT ORDER shall be mailed to:

Peter T. Lynch, Chief
Metro Region
Enforcement Element
Division of Water Resources
1100 Raymond Boulevard - Room 510
Newark, New Jersey 07102

20. Fisher hereby consents to and agrees to comply with all the terms and provisions of this ADMINISTRATIVE CONSENT ORDER, which shall be fully enforceable in the Superior Court of New Jersey having jurisdiction over the subject matter and signatory parties, upon the filing of a summary action for compliance pursuant to N.J.S.A. 58:10A-1 et seq. and also may be enforced in the same fashion as an Administrative Order issued by the NJDEP pursuant to this same statutory authority.

21. This ADMINISTRATIVE CONSENT ORDER shall not preclude the NJDEP from taking whatever action it deems appropriate to enforce the water pollution control laws of the State of New Jersey in any manner not inconsistent with the terms of this ADMINISTRATIVE CONSENT ORDER. Nothing in this ADMINISTRATIVE CONSENT ORDER shall constitute a waiver of any statutory right of NJDEP pertaining to any of the laws of the State of New Jersey, should NJDEP determine that additional remedial actions are necessary to protect the public health, safety or welfare.

22. The provisions of this ADMINISTRATIVE CONSENT ORDER shall be binding on Fisher, its subsidiaries and divisions and their respective directors, officers, employees, agents, successors and assigns and any trustee in bankruptcy or receiver appointed pursuant to law or equity.

23. No obligations imposed by this ADMINISTRATIVE CONSENT ORDER are intended to constitute a debt, damage claim, penalty or other civil action which should be limited or discharged in a bankruptcy proceeding. All obligations imposed by this ADMINISTRATIVE CONSENT ORDER shall constitute continuing regulatory obligations imposed pursuant to the police powers of the State of New Jersey, intended to protect the public health, safety and welfare.

24. Force Majeure. If any event occurs which purportedly causes or may cause delays in the achievement of any provision of this ADMINISTRATIVE CONSENT ORDER, Fisher shall notify NJDEP in writing within ten business days of the delay or anticipated delay, as appropriate, describing the anticipated length, precise cause or causes, measures taken or to be taken, and the time required to minimize the delay. Fisher shall adopt all reasonable necessary measures to prevent or minimize delay. Failure by Fisher to comply with the notice requirements of this paragraph shall render this Force Majeure provision void and of no effect as to the particular incident involved.

If the delay or anticipated delay has been or will be caused by fire, flood, riot, strike, or any circumstances alleged to be beyond the control of Fisher, then the time for performance hereunder shall be extended, subject to the approval of NJDEP, no longer than the delay resulting from such circumstances. However, if the events causing such delay are not found to be beyond the control of Fisher, failure to comply with the provisions of this ADMINISTRATIVE CONSENT ORDER shall not be excused as herein provided and shall constitute a breach of the ADMINISTRATIVE CONSENT ORDER's requirements. The burden of proving that any delay is caused by circumstances beyond the control of Fisher and the length of such delay attributable to those circumstances shall rest with Fisher. Delay in an interim requirement shall not automatically justify or excuse delay in the attainment of subsequent requirements.

25. Compliance with the terms of this ADMINISTRATIVE CONSENT ORDER shall not excuse Fisher from compliance with all applicable federal and state statutes and regulations while carrying out the obligations imposed by this ADMINISTRATIVE CONSENT ORDER.

26. All data and information, including raw sampling and monitoring data, generated pursuant to this ADMINISTRATIVE CONSENT ORDER by Fisher or on behalf of Fisher, shall be made available to NJDEP or a person acting on behalf of NJDEP.

27. No informal advice, guidance, suggestions, or comments by NJDEP or persons acting on behalf of NJDEP shall be construed as relieving Fisher of its obligation to obtain formal approvals as may be required herein, unless such formal approvals shall be submitted to Fisher in writing.

28. For and in consideration of Fisher's compliance with the provisions of this ADMINISTRATIVE CONSENT ORDER, the State of New Jersey, Department of Environmental Protection, hereby releases Fisher, its subsidiaries and divisions and their respective directors, officers, employees, agents, successors and assigns (hereinafter "Fisher et al.") from any and all civil actions, claims, demands and causes of action: 1) directly associated with or arising out of the presence, as of the effective date of this ADMINISTRATIVE CONSENT ORDER, of 1,1,1 trichloroethane, chloroform, tetrachloroethylene, carbon tetrachloride, trichloroethylene, 1,1 dichloroethane, 1,2 dichloroethane, 1,1 dichloroethylene, 1,2 dichloroethylene, bromoform, methylene chloride and bromodichloromethane, which are all of the contaminants which are known by NJDEP to have been detected, in the five potable water wells identified in paragraph 1; 2) for the presence at the site of any contaminants remedied by the remedial actions taken pursuant to paragraph 14; and 3) directly associated with or arising out of the presence of any other contaminants in any of the five potable water wells identified in paragraph 1, provided that the presence of such other contaminants does not render any of the five water wells non-potable after treatment by the air stripping unit and related appurtenances to be utilized by the Borough of Fair Lawn and provided that the presence or treatment of such other contaminants does not result in any unreimbursed additional cost to the Borough of Fair Lawn; provided, however, that NJDEP reserves its right: i) to proceed against Fisher et al. for any violations of this ADMINISTRATIVE CONSENT ORDER and: ii) to require Fisher et al. to take additional remedial actions should the NJDEP determine that such actions are necessary to protect the public health, safety and welfare.

29. Upon execution of this ADMINISTRATIVE CONSENT ORDER, NJDEP waives its right to seek civil penalties against Fisher et al. for the contaminants covered in clauses 1, 2 and 3 of paragraph 28 up to the effective date of this ADMINISTRATIVE CONSENT ORDER; provided, however, that NJDEP reserves the right to seek civil penalties against Fisher et al. for any violations of this ADMINISTRATIVE CONSENT ORDER.

30. Wherever this ADMINISTRATIVE CONSENT ORDER requires by its terms that NJDEP make a determination or give approval, such determination or grant or denial of approval shall not be arbitrary or capricious or unreasonable.

31. When this ADMINISTRATIVE CONSENT ORDER becomes effective, Fisher waives its right to any hearing on the entry of this ADMINISTRATIVE CONSENT ORDER and any of its terms; provided however, that Fisher preserves all of its rights with respect to the interpretation of this ADMINISTRATIVE CONSENT ORDER and any claim that it has violated the terms of this ADMINISTRATIVE CONSENT ORDER.

32. Upon Fisher's performance of all its obligations under this ADMINISTRATIVE CONSENT ORDER, including all monitoring and maintenance requirements, NJDEP shall terminate this ADMINISTRATIVE CONSENT ORDER.

This ADMINISTRATIVE CONSENT ORDER shall take effect upon the signature of both parties.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BY AUTHORITY OF
JOHN W. GASTON, JR.
DIRECTOR
DIVISION OF WATER RESOURCES

DATE 3/21/84

BY: George G. McCann

GEORGE G. McCANN
ASSISTANT DIRECTOR
ENFORCEMENT ELEMENT

DATE 3/19/84

FISHER SCIENTIFIC COMPANY

BY: Thomas P. Lawton

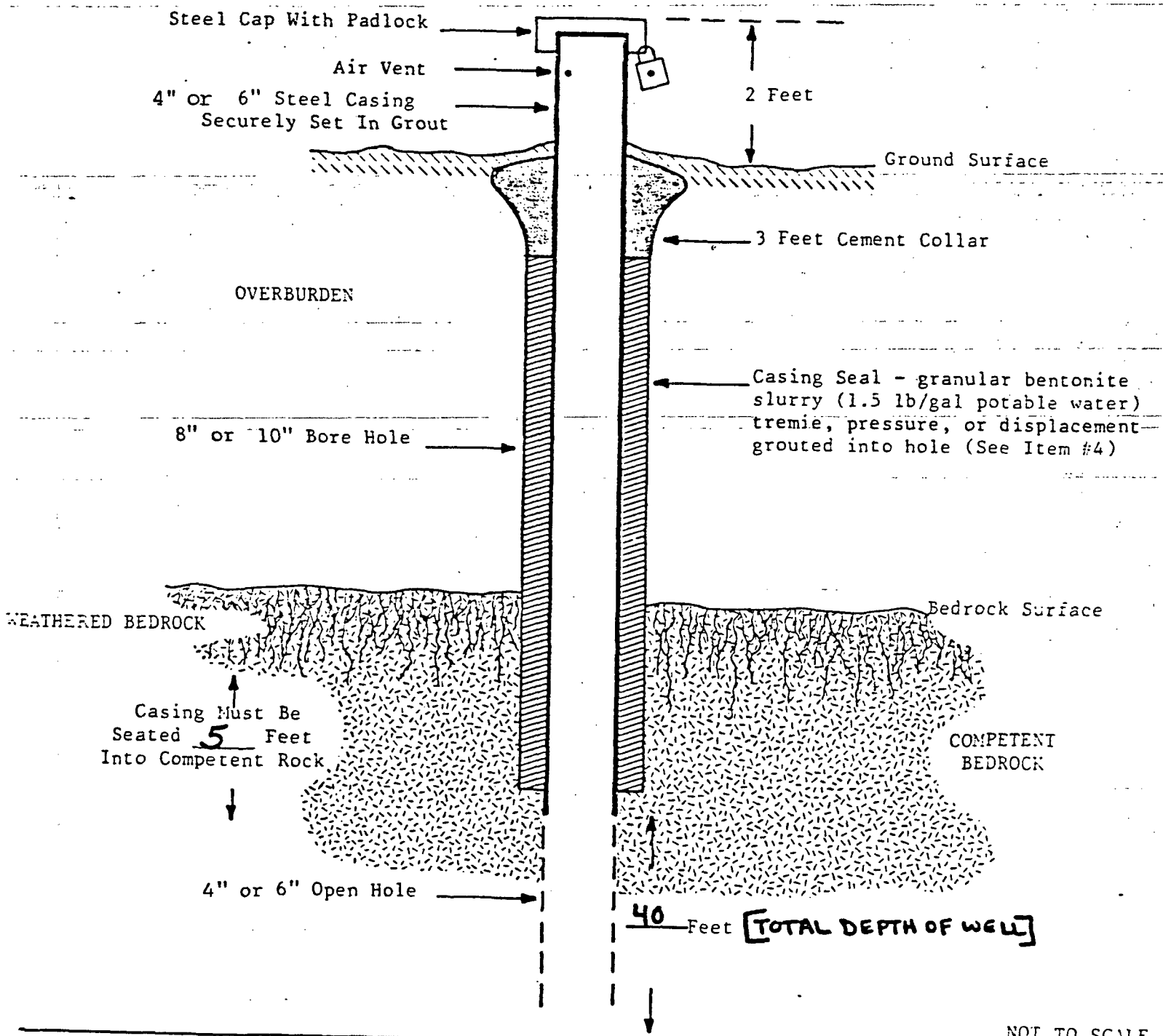
THOMAS P. LAWTON
PRESIDENT

New Jersey Department of Environmental Protection
Ro[illegible]onitor Well Speci[illegible]ations* [SHALLOW]

Site Name: FISHER SCIENTIFIC CO.

Location: FAIR LAWN, BERGEN COUNTY

Date: DECEMBER, 1983



NOT TO SCALE

REQUIREMENTS:

1. Notification to the NJDEP is required two (2) weeks prior to drilling.
2. State well permits are required for each montior well constructed by the driller. Report "use of well" on well permit application. Permit number must be permanently affixed to each monitor well.

ATTACHMENT A

3. Oversize borehole minimum four (4) inches greater than casing diameter drilled through overburden and casing sealed ten (10) feet into competent rock unless shown otherwise above.
4. Approved high grade sodium base, well sealant type, granular bentonite must be used to seal casing. Casing sealant and drilling fluids must be mixed with potable water.
5. Well must be developed upon completion for a minimum of one (1) hour or to yield a turbid-free discharge.
6. The driller must maintain an accurate written log of all materials encountered in each hole, record all construction details for each well, and record the depth of major water bearing fracture zones. This information must be submitted to the Office of Water Allocation as required by N.J.S.A. 58:4A.
7. Cement collar must be installed a minimum of one (1) hour after casing seal has been emplaced.
8. Locking caps must be provided to secure each well.
9. Top of each well casing (excluding cap) must be surveyed to the nearest hundreth foot (0.01) by a licensed surveyor. The casing must be permanently marked at the point surveyed. The well should be numbered clearly on the casing. A detailed site map with well locations and casing elevations must be submitted to METRO ENFORCEMENT, DWR.

10. NOTICE IS HEREBY GIVEN OF THE FOLLOWING:

a. Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules;
b. The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable or other structures;
c. The permittee (applicant) is solely responsible for safety and adequacy of the design and construction of well required to be constructed by the Department;
d. The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

ADDITIONAL REQUIREMENTS (IF CHECKED):

☒ 1. Split Spoon Samples (In Overburden) AS REQUIRED IN A CO.
☒ 2. Rock Core Samples OPTIONAL
☒ 3. Dedicated Bailer (Sampler) in Well(s) OPTIONAL
☒ 4. Borehole Geophysical Log(s) OPTIONAL
☒ 5. Other DRILLER MUST BE LICENSED AS PER NJSA 58:4A-5 et seq.

* OTHER DRILLING METHODS, MATERIALS, DESIGNS AND CASING DIAMETERS MAY BE USED WITH PRIOR APPROVAL BY NJDEP.

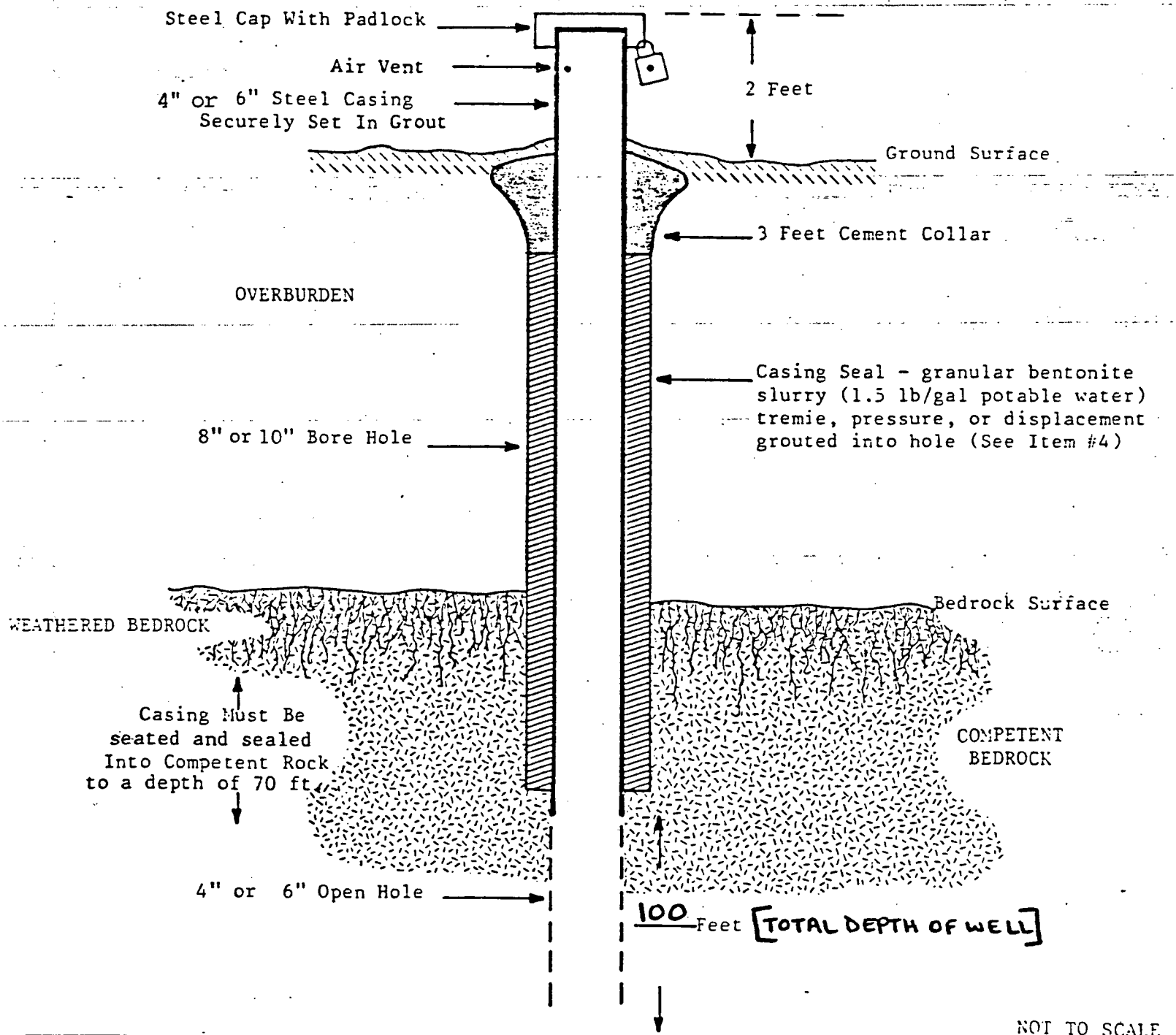
Rev. 9/83

New Jersey Department of Environmental Protection
Ro x Monitor Well Speci sations* [DEEP]

Site Name: FISHER SCIENTIFIC CO.

Location: FAIR LAWN, BERGEN COUNTY

Date: DECEMBER, 1983

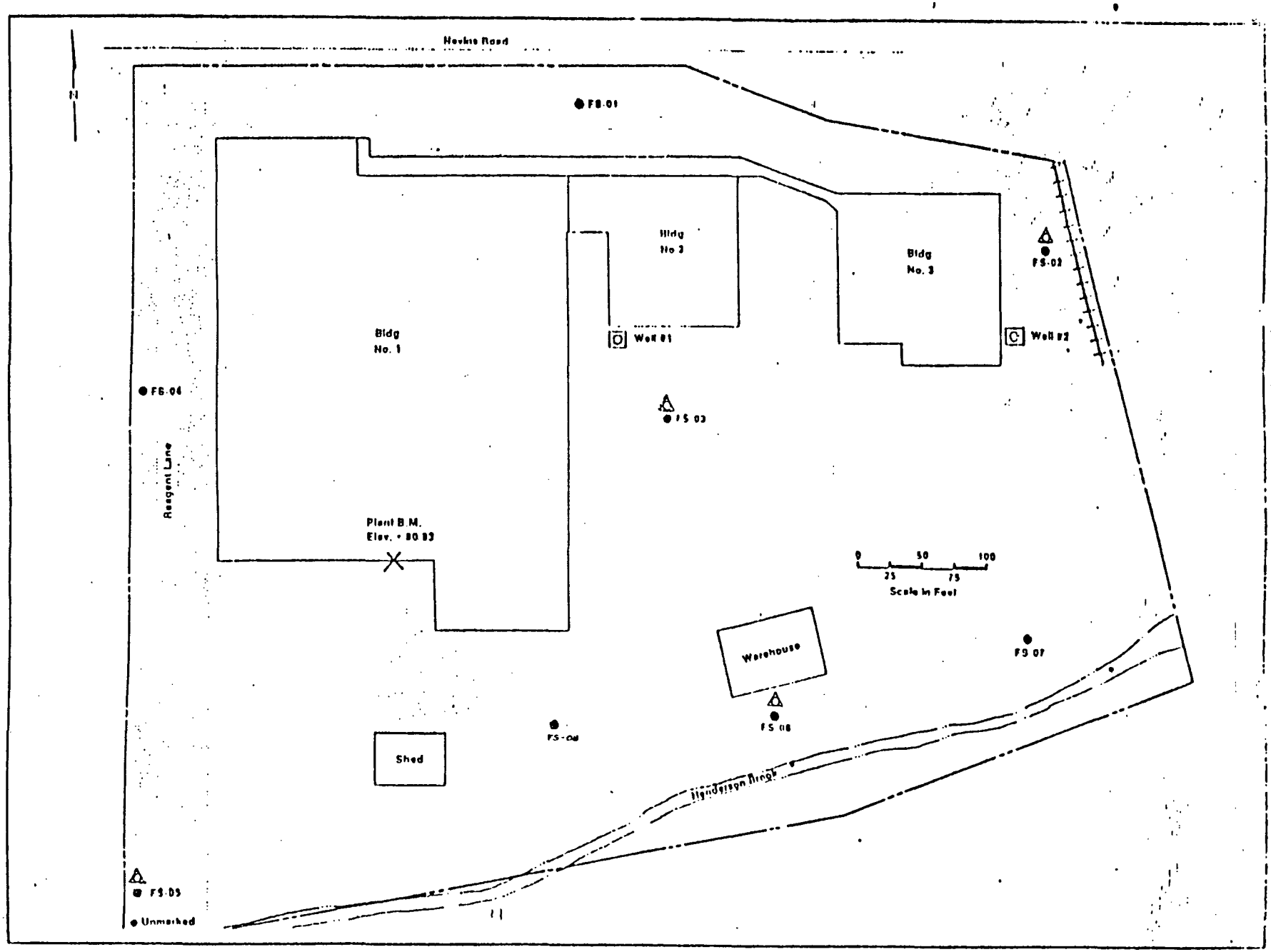


NOT TO SCALE

REQUIREMENTS:

1. Notification to the NJDEP is required two (2) weeks prior to drilling.
2. State well permits are required for each montior well constructed by the driller. Report "use of well" on well permit application. Permit number must be permanently affixed to each monitor well.

ATTACHMENT B



LEGEND :

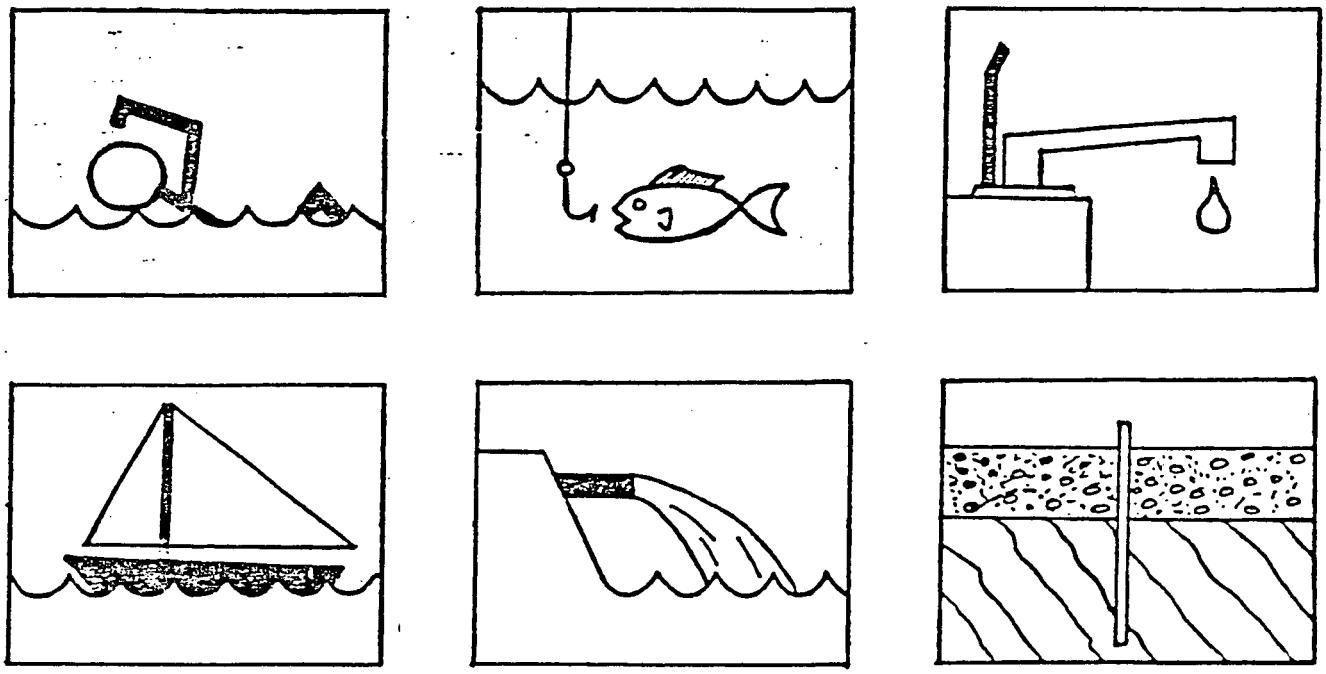
- ● SHALLOW MONITOR WELL
- △ DEEP MONITOR WELL

SITE MAP FISHER SCIENTIFIC CO., FAIR LAWN, N.J.

GENERAL LOCATIONS OF MONITOR WELLS

ATTACHMENT C

FIELD PROCEDURES MANUAL FOR WATER DATA ACQUISITION



ATTACHMENT D

DIVISION OF WATER RESOURCES

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

3. Oversize borehol[illegible]imum four (4) inches greater than casing diameter drilled through overburden and casing sealed ten (10) feet into competent rock unless shown otherwise above.
4. Approved high grade sodium base, well sealant type, granular bentonite must be used to seal casing. Casing sealant and drilling fluids must be mixed with potable water.
5. Well must be developed upon completion for a minimum of one (1) hour or to yield a turbid-free discharge.
6. The driller must maintain an accurate written log of all materials encountered in each hole, record all construction details for each well, and record the depth of major water bearing fracture zones. This information must be submitted to the Office of Water Allocation as required by N.J.S.A. 58:4A.
7. Cement collar must be installed a minimum of one (1) hour after casing seal has been emplaced.
8. Locking caps must be provided to secure each well.
9. Top of each well casing (excluding cap) must be surveyed to the nearest hundreth foot (0.01) by a licensed surveyor. The casing must be permanently marked at the point surveyed. The well should be numbered clearly on the casing. A detailed site map with well locations and casing elevations must be submitted to METRO ENFORCEMENT, DWR.

10. NOTICE IS HEREBY GIVEN OF THE FOLLOWING:

   a. Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules;
   b. The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable or other structures;
   c. The permittee (applicant) is solely responsible for safety and adequacy of the design and construction of well required to be constructed by the Department;
   d. The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

ADDITIONAL REQUIREMENTS (IF CHECKED):

☒ 1. Split Spoon Samples (In Overburden) AS REQUIRED IN ACO
☒ 2. Rock Core Samples OPTIONAL
☒ 3. Dedicated Bailer (Sampler) in Well(s) OPTIONAL
☒ 4. Borehole Geophysical Log(s) OPTIONAL
☒ 5. Other DRILLER MUST BE LICENSED AS PER NJSA 58:4A-5 et seq.

* OTHER DRILLING METHODS, MATERIALS, DESIGNS AND CASING DIAMETERS MAY BE USED WITH PRIOR APPROVAL BY NJDEP.

Rev. 9/83

NEW JERSEY STATE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

ROBERT E. HUGHEY, Commissioner

DIVISION OF WATER RESOURCES

John W. Gaston, Jr., Director

First Printing 1980
Second Printing 1983

Available through the Office of Quality Assurance, Division of Water Resources, P.O. Box CN-029, Trenton, New Jersey 08625

15. Groundwater Sampling

To ensure a representative sample from a potable well or a monitor well, flushing or pumping is almost always required. In general, the ground water standing in the well casing at the time of sample collection will be similar in quality to that in the surrounding aquifer, but it may not be representative. Therefore, whenever required pump (or bail) the well to waste prior to collecting a sample.

(a) Sampling Municipal or Industrial Wells

It is desirable to sample as close to the well source as possible. Samples should be taken directly from the well head whenever possible. This will eliminate chlorination or other interferences, possible changes within the piping, mixing of water from other wells, and so on.

Large capacity wells which are "on-line" and producing prior to the visit may be sampled immediately.

Municipal wells which are temporarily shut down at the time of visit must be pumped to waste prior to sampling. Ten minutes or more is suggested.

Access to municipal well systems, well houses etc., invariably requires the assistance of a water department employee. Prior notification is essential.

(b) Sampling Domestic Wells

An operating domestic well must be pumped to waste prior to sample collection. Samples taken immediately will be water from the plumbing and not directly from the aquifer. It is therefore essential to evacuate the plumbing and water storage tanks. House storage tanks vary in capacity but 50 gallons is not unusual. A 10-minute interval before sample collection is essential; longer is desirable. Listen for the well pump to come on; this indicates that the plumbing is being evacuated. Opening all faucets, flushing the toilet, etc., will use water and shorten the waiting time before sampling.

Samples should be taken as close to the pumping well as possible. Therefore, basement faucets or outside faucets are always preferable.

The well owner should be questioned about any treatment equipment installed on his system. Softening, iron removal, turbidity removal, disinfection, pH adjustment and other equipment is often used; these will give misleading analyses, depending on the parameters one is sampling for. Home carbon filters for the removal of organics also are increasingly popular. Basement and outside faucets will usually avoid such treated water.

If a sample must be taken following a treatment unit, the type, size and purpose of the unit should be noted on sample sheets and field notes.

Home faucets, particularly kitchen faucets, usually have a screen installed on the discharge. This must be removed prior to sampling for bacteria, or for volatile organics since the screen tends to agitate the discharge and some organics may be lost. When sampling for bacteria, you should not take a sample from a swivel faucet, since these swivel joints may harbor a significant bacterial population.

(c) Sampling Monitor Wells

Evacuation before sampling of the water standing in a well is almost always necessary. This removes unrepresentative water and induces ground water from the surrounding formation to enter the well. Such evacuation can be done with pumps or bailers. Few monitor wells are equipped with pumping gear, so the collection of representative ground water samples will be somewhat laborious and will require time and attention to detail.

Access to monitor wells may be difficult and the wells themselves hard to locate in the field. Obtain information on location, access, permission, etc. before visiting the site. Monitor wells usually have a friction cap or screw cap, and this may be locked. Tools for removing the caps and keys to unlock the wells are often necessary.

If several monitor wells must be sampled, proper designation of each is essential. The well number assigned by the well owner (or by the Department) should be known. If numbers are not assigned, precise field description is essential so as to avoid confusing the well sample results and the judgments based on them. Field notes are essential.

For pump samples, an excellent rule-of-thumb is to pump a volume of water equal to three (3) times that standing in the casing before taking the sample.

However, if circumstances dictate less than three (3) exchanges, at least one (1) exchange must be made if a sample is to be representative. The only exceptions are for very low-yield wells and in cases where grab samples are needed. (See Below).

e.g. A 4-inch casing has 0.65 gallons per foot; if there is a 20-foot water column in the well, the well contains approximately 13 gallons. About 40 gallons then should be removed. If a

pumping rate of 2 gallons per minute is used, the well should be pumped about 20 minutes before the sample is taken.

Two-inch casing contains 0.16 gal/foot; this and 4-inch are the two most common diameters. See Appendix H for a chart showing volumes of other size casings and formulas to use on sizes not listed. A calibrated steel tape or other device should be on hand to measure the depth-to-water and the well depth if not already known. Estimates will suffice. Sample results that might be used in court must adhere closely to these procedures. For wells which are good producers, pumping 3 to 5 times the casing volume is suggested. However, do not overpump since dilution of the samples is also possible. Consider five (5) changes a maximum.

Depending on the geology, well design and other factors, some monitor wells will have a very low yield. In such cases the standing water should be evacuated and a sample collected upon recovery. If a well is known to have a very low yield or if time is important, collect a sample of the initial discharge. A possibly unrepresentative sample may be better than none, as long as the analysis is identified as being from a questionable sample.

(d) Grab Samples

In some instances grab samples are preferred over pumped samples. For example, a pumping well will draw water over the entire water column; the resulting sample will be more diluted than a grab sample. Also, water quality information versus depth is precluded. If precise concentrations are required, or if information is needed on where within the water column a pollutant is floating, individual grab samples at specific depths are then necessary.

If a water quality parameter is not subject to chemical change (e.g. nitrate nitrogen) within a well casing in contact with the atmosphere, a pump sample may not be necessary.

(e) Volatile Organics

Volatile organics (e.g. benzene, trichloroethylene, toluene) will decrease in concentration standing in the well. If a grab sample is to be taken, the sample should be collected from a few feet down within the water column.

Particularly when sampling for very low levels of volatiles, care must be taken as to the source of the water used in priming the centrifugal pump.

When bailing or grab sampling for volatile organics, methanol and distilled water should be on hand to thoroughly clean the sampler prior to reuse. Wash it first with methanol, then rinse with distilled water. Allow the methanol to volatilize before resuming sampling.

Submersible and particularly centrifugal pumps agitate the flow and thus may cause some loss of volatiles. The volatile organic samples should therefore be collected using a clean bailer once the well has been flushed with a pump. The bailer should be lowered opposite the well screen and then worked up and down to fill the bailer with water from that depth. Never collect a sample for volatile organics from the surface of the water column.

Be aware that old wells equipped with oil-lubricated pumps may give false high results.

If the sample must be collected from the pump, reduce the discharge to a trickle when ready to sample. This will reduce agitation and loss of volatile compounds.

When several wells are to be sampled for volatiles, the least contaminated well should be sampled first, and the wells then sampled in ascending degree of contamination. If the levels of contamination are unknown, clean water should be pumped through the pump before the next well is sampled. An extended pumping of the next well will help to minimize cross contamination of samples by purging the pump and the hose of any residual water.

(f) Trace Metal Sampling and Analysis of Ground Water

Samples for dissolved metals must be filtered immediately following sample collection (see procedure in section III) and then preserved with nitric acid. Filtering of turbid samples is necessary because the addition of acid may result in a transfer of adsorbed metal ions or particulates to solution in the water phase of the sample. This may lead to much higher analytical results. Therefore, the following procedures will apply to samples collected for trace metal analysis of ground water:

1. For new investigations, that is, when ground water quality is still uncertain, NO FILTERING will be required for the INITIAL round of samples. Unfiltered samples will represent "worst case" with respect to metal content. Thus, if no significant levels are detected, further sampling for metals normally will not be required.

2. If metal concentrations significantly above ground water standards are confirmed, two (2) samples will then be collected from each well: one sample filtered according to NJDEP procedures and a second, unfiltered, sample. These results, when compared, will determine which is the more representative of existing ground water conditions. If the filtered versus unfiltered results do not agree, the Department will determine if filtering will be required for the investigation in question. Normally, however, filtering will be requested but circumstances may dictate that further dual-sample comparisons be made. The use of one or more sampling comparisons should resolve the field filtration question early on and provide data to support that decision in each investigation.

3. Nearly all monitor wells will have some degree of turbidity although some may clear after extended pumping. However, in those instances where turbidity is expected to be very low (e.g. pumping municipal wells, most domestic wells, rigorously designed monitor wells), filtering prior to acidification normally will not be required.

(g) Equipment and Use

There are many types of pumps; unfortunately, most pumping equipment agitates the flow. If, for example, centrifugal or submersible pumps are used, the discharge must be reduced to a trickle before bottles are filled for a volatile organics analysis. It is preferable after well evacuation to then collect the sample with a bailer lowered opposite the well screen.

Equipment needed for pump-sampling monitor wells may include: portable centrifugal pump, 3-inch or 4-inch submersible pumps, bailers and Kemmerer type samplers, hoses, priming water jugs, hose clamps, screwdrivers, tools for removing well caps and calibrated tapes, etc., for measuring well depths and static water levels.

When using surface pumps and hoses, the end of the hose should be deep enough into the water column to avoid pumping air or breaking suction when the level is drawn down. On the other hand, keep the hose above the bottom to avoid pumping sand or other solids which will increase sample turbidity, shorten pump life, and so on.

After use, the chamber in the centrifugal pump must be drained through the plug provided for this. At the end of the work day clean water must be run through both pump and hose.

Submersible pumps are very susceptible to clogging with sand. Turbid ground waters or poorly-developed monitor wells are almost certain to clog them. The centrifugal pump or a bailer should be used instead. Bedrock wells are much less likely to pump sand than those screened in unconsolidated materials.

The clearance between a 4-inch well casing and a submersible pump is very small; it is imperative that the pump be lowered carefully and that the hose and electrical line be "fed" so they do not jam between pump and casing. Similarly, the hose and electric line must be carefully pulled up ahead of the pump during its removal. Submersible pumps, the 3-inch particularly, are sensitive equipment. They must be handled and transported carefully.

A monitor well may be "pumped" using a bailer, a simple device which consists essentially of a cylinder equipped with a bottom valve lowered by a line. Several diameters are available (1 to 3 inches) to accomodate the more common casing diameters.

Each lowering of the bailer will remove (when full) a known volume of water. Therefore, once the casing volume is estimated, the well may be bailed repeatedly until at least one (1) and more preferably three (3) exchanges of that volume are made. The sample may then be collected. The larger the bailer used, the shorter the bailing time needed prior to sample collection.

Avoid hitting the bottom of the well with the bailer and clogging the valve with grit.

Bailers may be used as a crude pump if samples are desired from a specific depth(s). When the casing water has been exchanged, lower the bailer to the desired level (must be opposite the screened portion of the well) and pull up and down about 10 minutes. The valve will act as a check valve and admit some water each time the bailer descends. Eventually, the bailer will fill with ground water from that level. It may then be brought to the surface and the sample collected.

SAMPLE HANDLING, PRESERVATION, AND LABELING

As discussed in section B, samples may be collected in special sample collection devices and then transferred into the appropriate sample containers or they may be collected directly into the sample containers. The method of sample collection is governed by the type of analyses, type of sample, and the nature of the survey. Whichever the case, the following instructions are to be followed: